FIG. 1

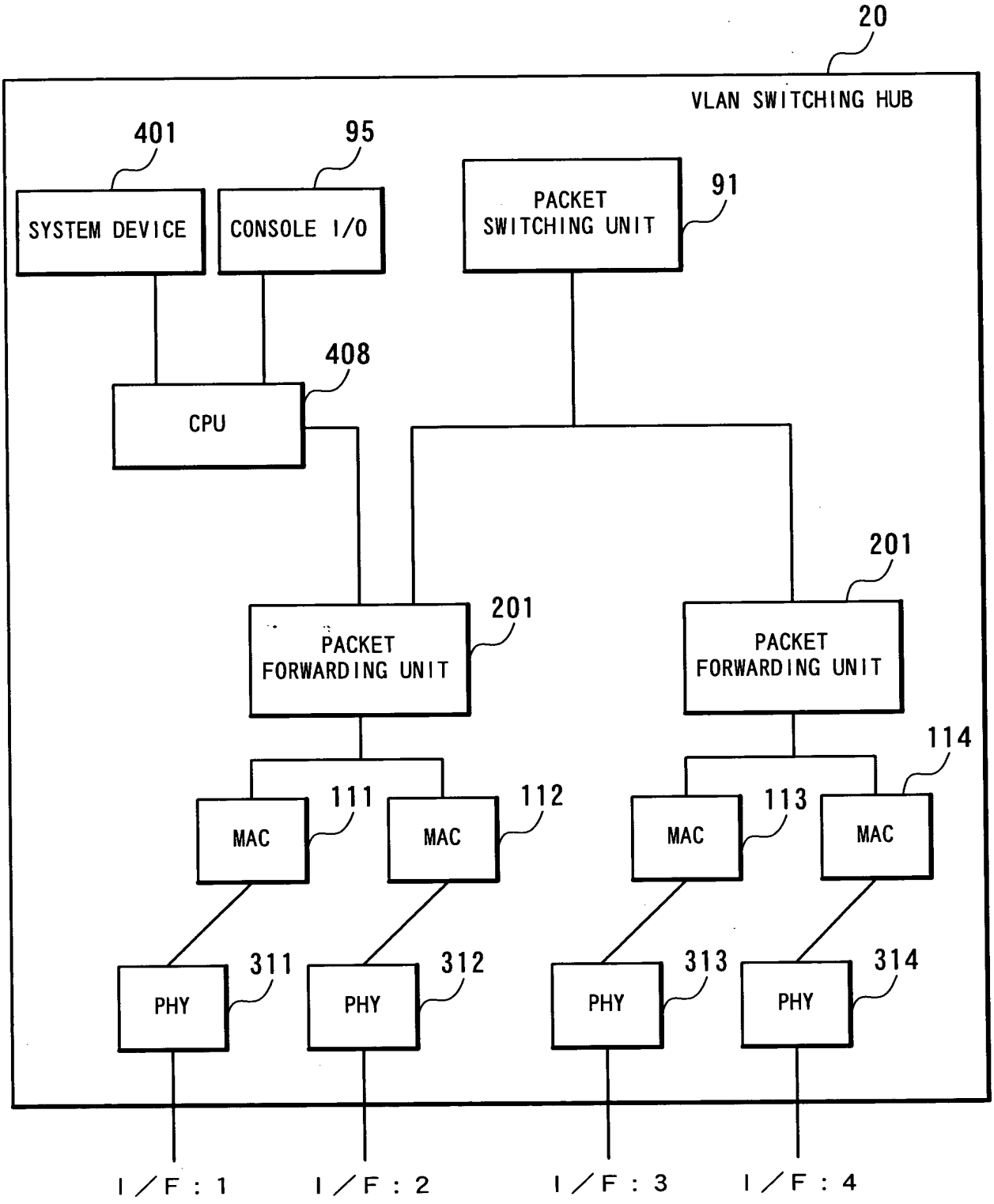

20
VLAN SWITCHING HUB
401
95
SYSTEM DEVICE
CONSOLE I/O
PACKET SWITCHING UNIT
91
408
CPU
201
201
PACKET FORWARDING UNIT
PACKET FORWARDING UNIT
114
111
112
113
MAC
MAC
MAC
MAC
311
312
313
314
PHY
PHY
PHY
PHY
I/F : 1
I/F : 2
I/F : 3
I/F : 4

FIG. 2

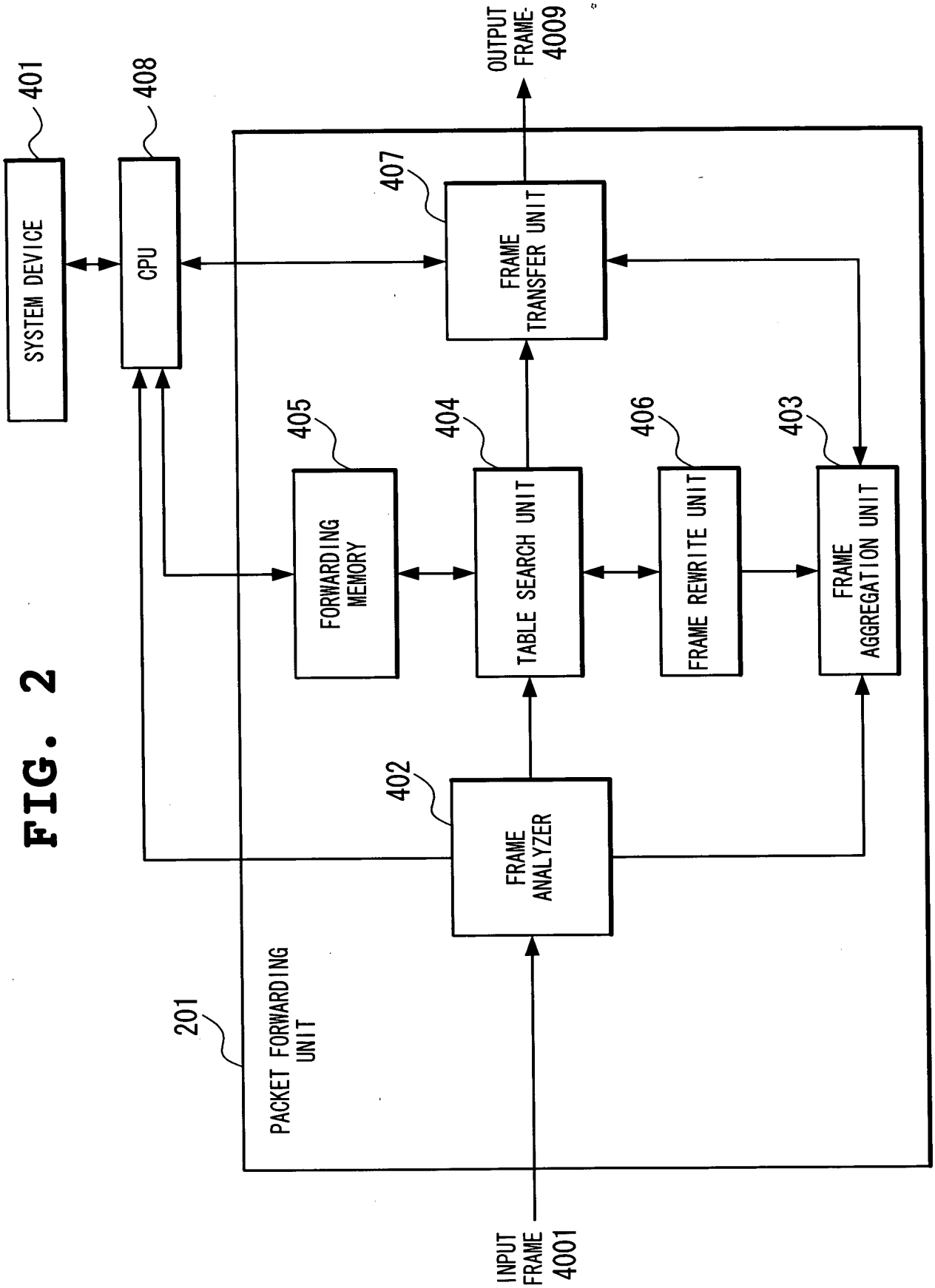

401
SYSTEM DEVICE
408
CPU
OUTPUT FRAME 4009
407
FRAME TRANSFER UNIT
405
FORWARDING MEMORY
404
TABLE SEARCH UNIT
406
FRAME REWRITE UNIT
403
FRAME AGGREGATION UNIT
402
FRAME ANALYZER
201
PACKET FORWARDING UNIT
INPUT FRAME 4001

FIG. 3

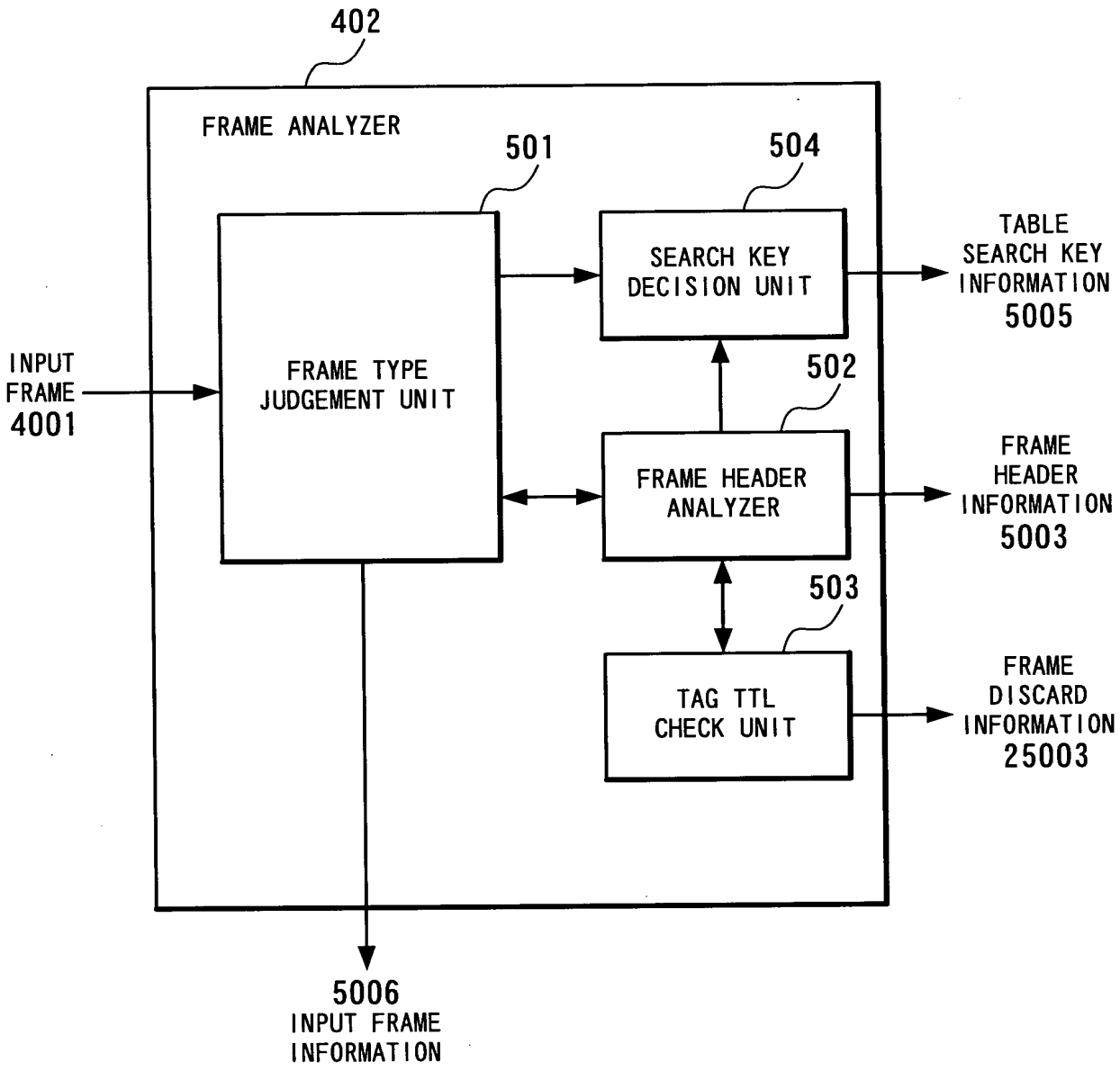

402
FRAME ANALYZER
501
504
SEARCH KEY DECISION UNIT
TABLE SEARCH KEY INFORMATION 5005
INPUT FRAME 4001
FRAME TYPE JUDGEMENT UNIT
502
FRAME HEADER ANALYZER
FRAME HEADER INFORMATION 5003
503
TAG TTL CHECK UNIT
FRAME DISCARD INFORMATION 25003
5006 INPUT FRAME INFORMATION

FIG. 4

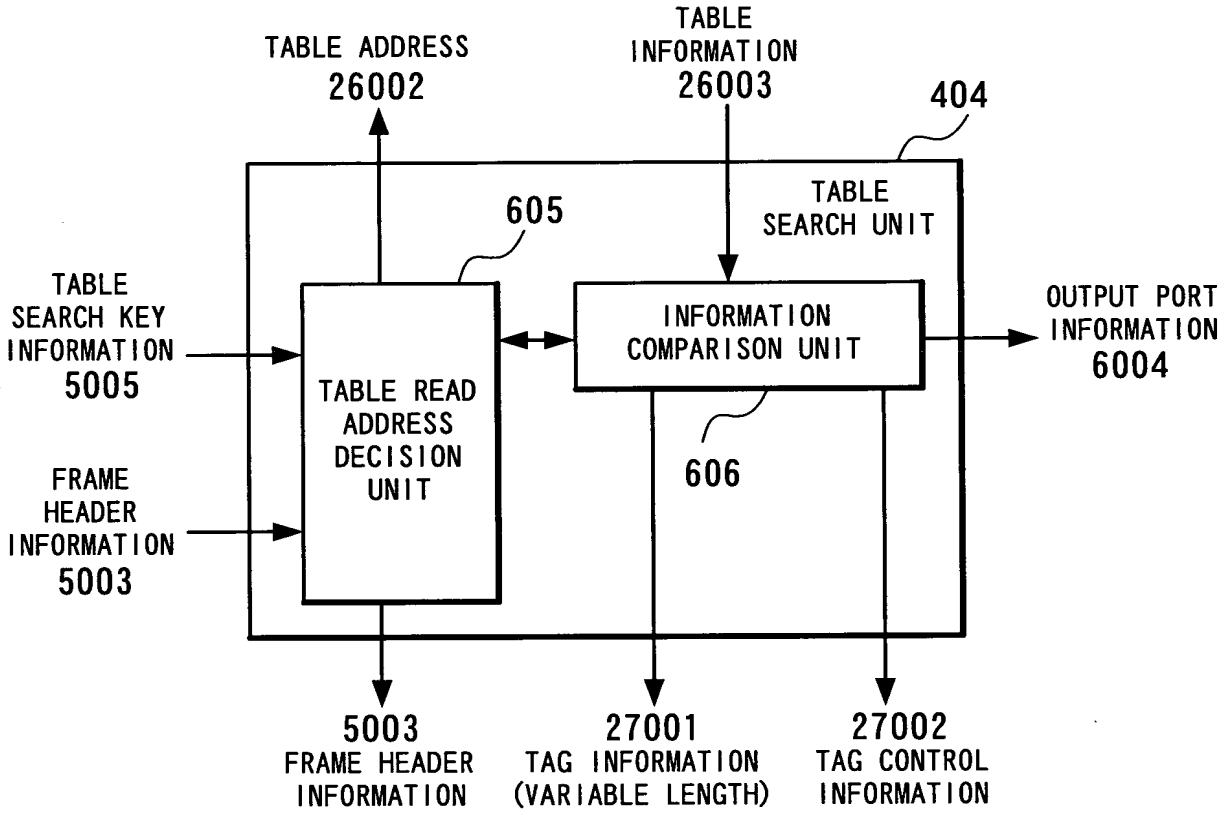


TABLE ADDRESS
26002
TABLE
INFORMATION
26003
404
TABLE
SEARCH UNIT
605
TABLE
SEARCH KEY
INFORMATION
5005
TABLE READ
ADDRESS
DECISION
UNIT
INFORMATION
COMPARISON UNIT
OUTPUT PORT
INFORMATION
6004
606
FRAME
HEADER
INFORMATION
5003
5003
FRAME HEADER
INFORMATION
27001
TAG INFORMATION
(VARIABLE LENGTH)
27002
TAG CONTROL
INFORMATION

FIG. 5

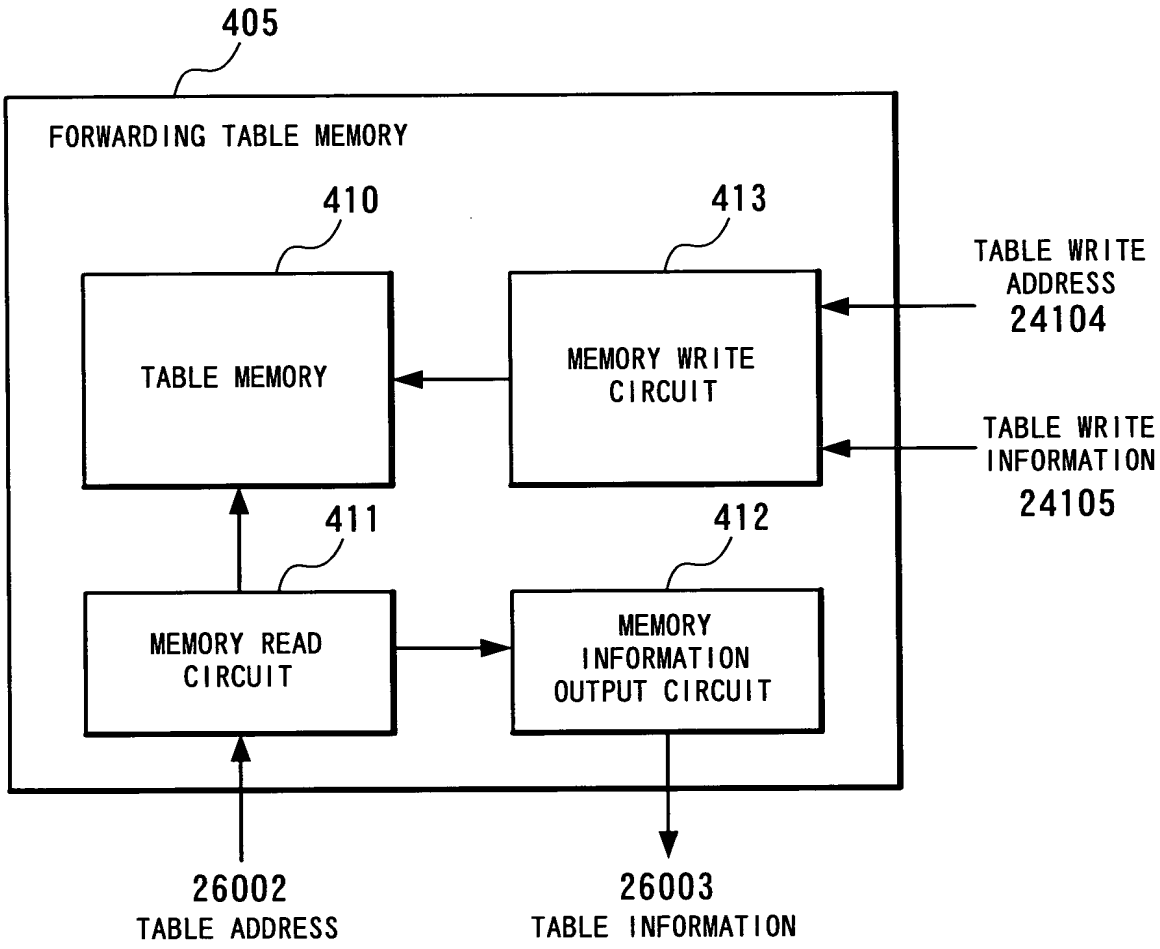

405
FORWARDING TABLE MEMORY
410
413
TABLE MEMORY
MEMORY WRITE CIRCUIT
TABLE WRITE ADDRESS
24104
TABLE WRITE INFORMATION
24105
411
412
MEMORY READ CIRCUIT
MEMORY INFORMATION OUTPUT CIRCUIT
26002
TABLE ADDRESS
26003
TABLE INFORMATION

FIG. 6

410

MAC SOURCE ADDRESS (48 BITS)	FIRST STEP TAG INFORMATION (32 BITS)	SECOND STEP TAG INFORMATION (32 BITS)	. . .	N STEP TAG INFORMATION (32 BITS)	NUMBER OF TAG CONTROL STEPS	TAG CONTROL INFORMATION	OUTPUT PORT INFORMATION
00-00-0c-01-02-03	OPERATION TAG TYPE	OPERATION INFORMATION	. . .	OPERATION INFORMATION	4	TAG INSERTION	1
00-00-0c-01-02-04	BUS PROVISIONING TAG TYPE	BUS PROVISIONING INFORMATION	. . .	BUS PROVISIONING INFORMATION	4	TAG REPLACEMENT	1
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
00-00-0c-01-02-05	ADDRESS INFORMATION TAG TYPE	ADDRESS INFORMATION	. . .	ADDRESS INFORMATION	3	TAG INSERTION	2
00-00-0c-01-02-05	FAILURE AVOIDANCE TAG TYPE	BYPASS INFORMATION	. . .	BYPASS INFORMATION	2	TAG INSERTION	2
00-00-0c-01-02-05	FAILURE NOTICE TAG TYPE	DEVICE FAILURE INFORMATION	. . .	DEVICE FAILURE INFORMATION	2	TAG INSERTION	2
00-00-0c-01-02-05	MAINTENANCE TAG TYPE	MAINTENANCE INFORMATION	. . .	MAINTENANCE INFORMATION	4	TAG REMOVE	0

FIG. 7

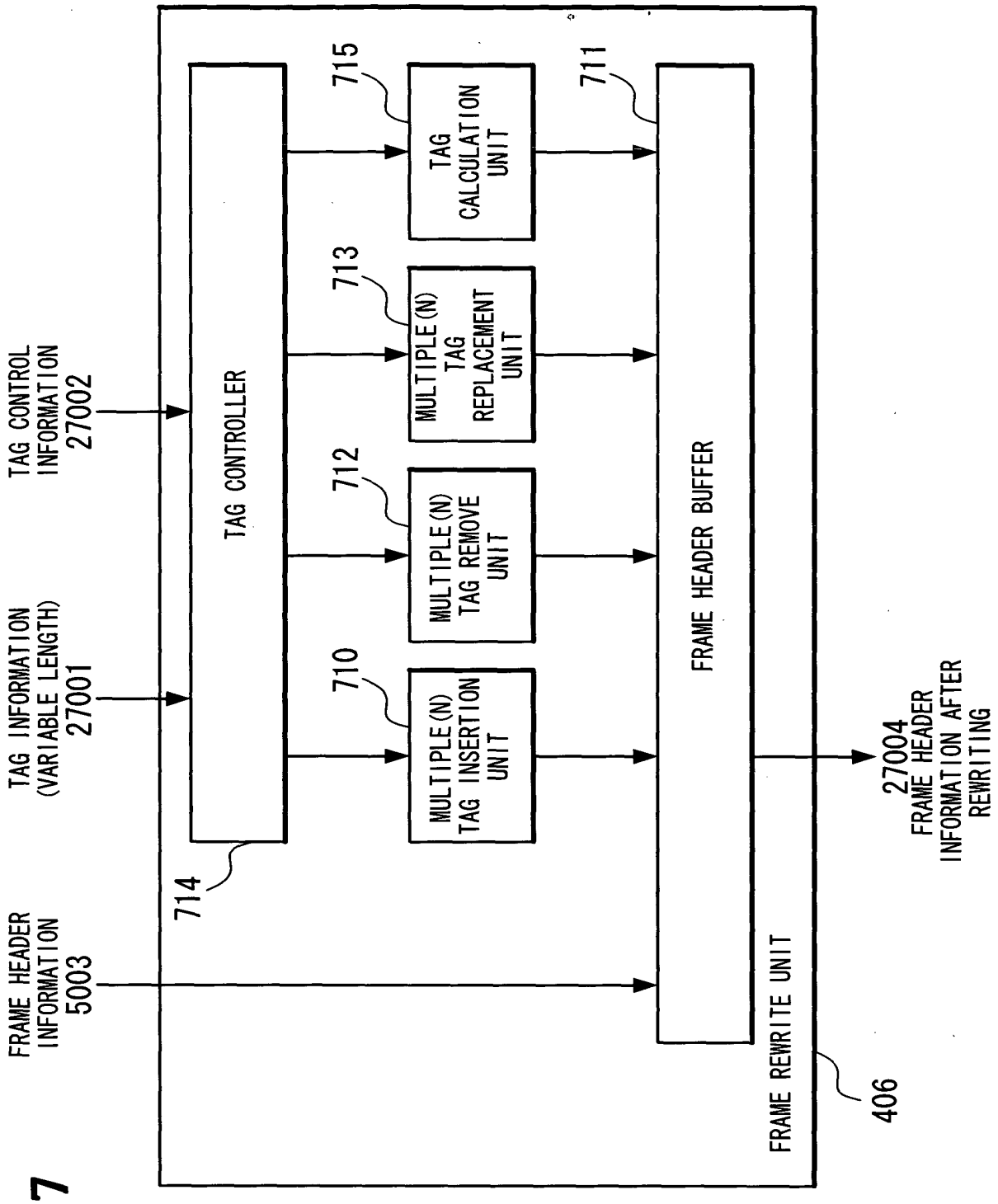

FRAME HEADER INFORMATION 5003
TAG INFORMATION (VARIABLE LENGTH) 27001
TAG CONTROL INFORMATION 27002
TAG CONTROLLER
714
MULTIPLE(N) TAG INSERTION UNIT
710
MULTIPLE(N) TAG REMOVE UNIT
712
MULTIPLE(N) TAG REPLACEMENT UNIT
713
TAG CALCULATION UNIT
715
FRAME HEADER BUFFER
711
FRAME REWRITE UNIT
406
27004 FRAME HEADER INFORMATION AFTER REWRITING

FIG. 8

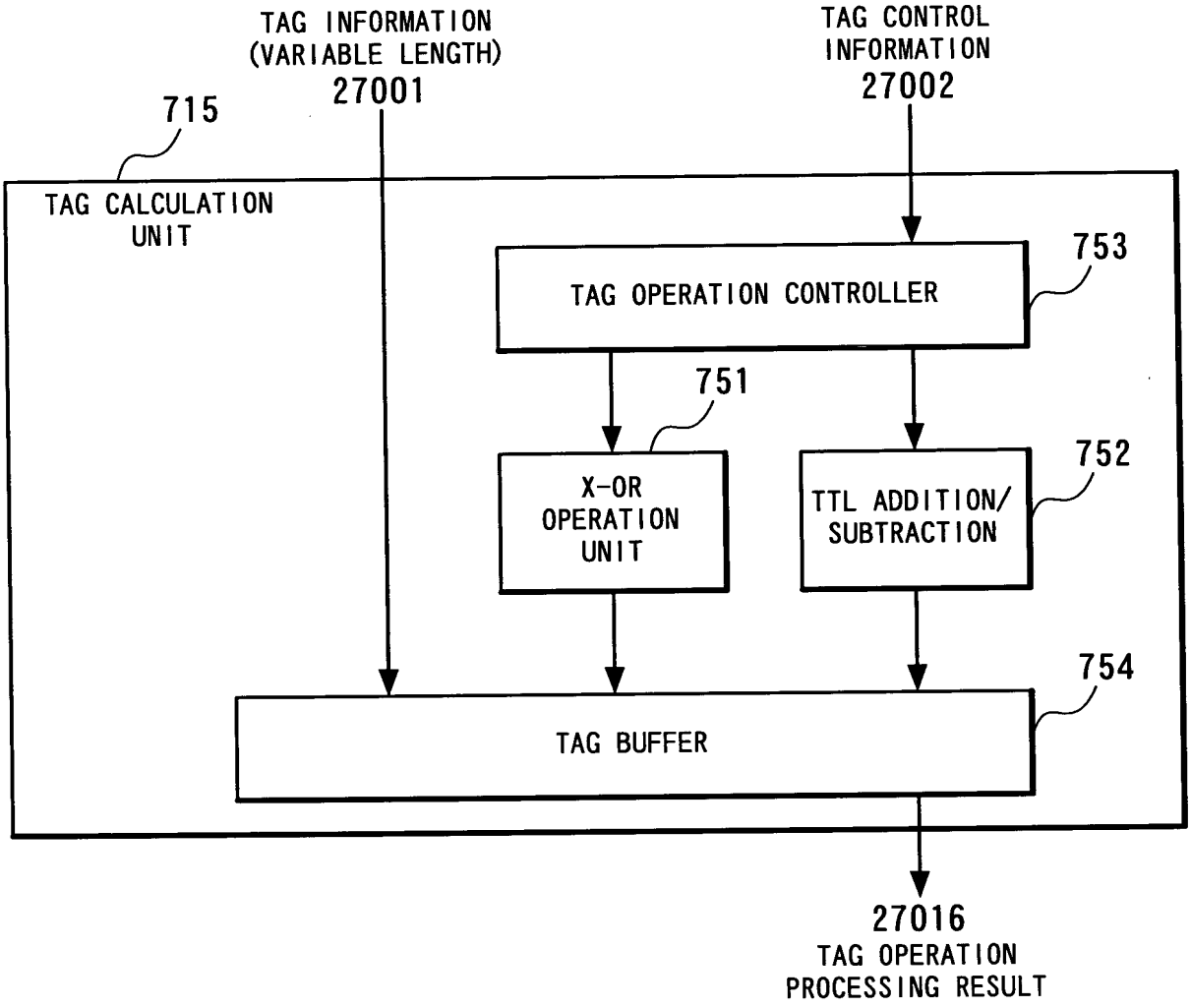

TAG INFORMATION
(VARIABLE LENGTH)
27001
TAG CONTROL
INFORMATION
27002
715
TAG CALCULATION
UNIT
TAG OPERATION CONTROLLER
753
751
X-OR
OPERATION
UNIT
TTL ADDITION/
SUBTRACTION
752
754
TAG BUFFER
27016
TAG OPERATION
PROCESSING RESULT

FIG. 9

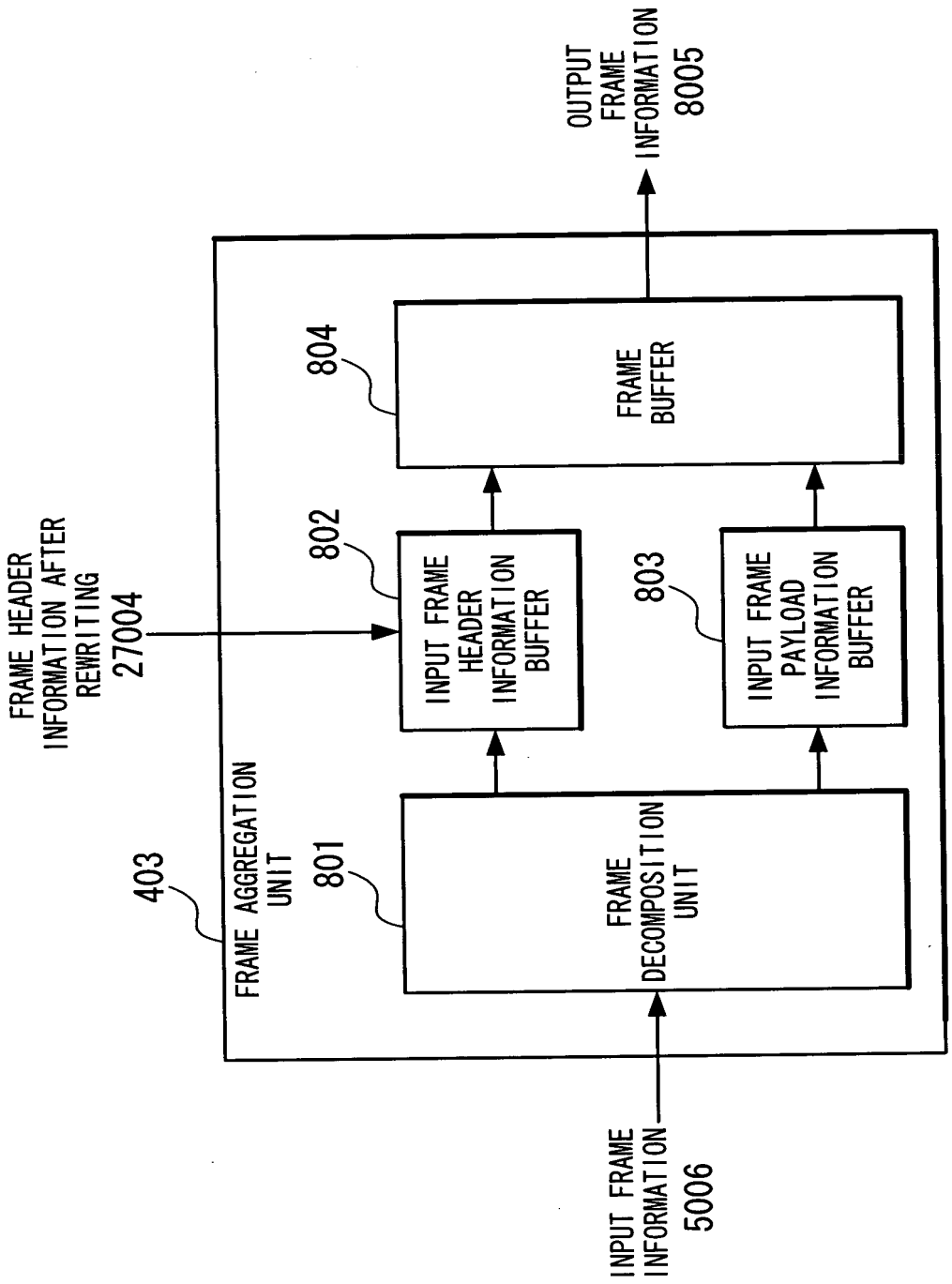

FRAME HEADER INFORMATION AFTER REWRITING 27004
403
FRAME AGGREGATION UNIT
801
FRAME DECOMPOSITION UNIT
802
INPUT FRAME HEADER INFORMATION BUFFER
803
INPUT FRAME PAYLOAD INFORMATION BUFFER
804
FRAME BUFFER
OUTPUT FRAME INFORMATION 8005
INPUT FRAME INFORMATION 5006

FIG. 10

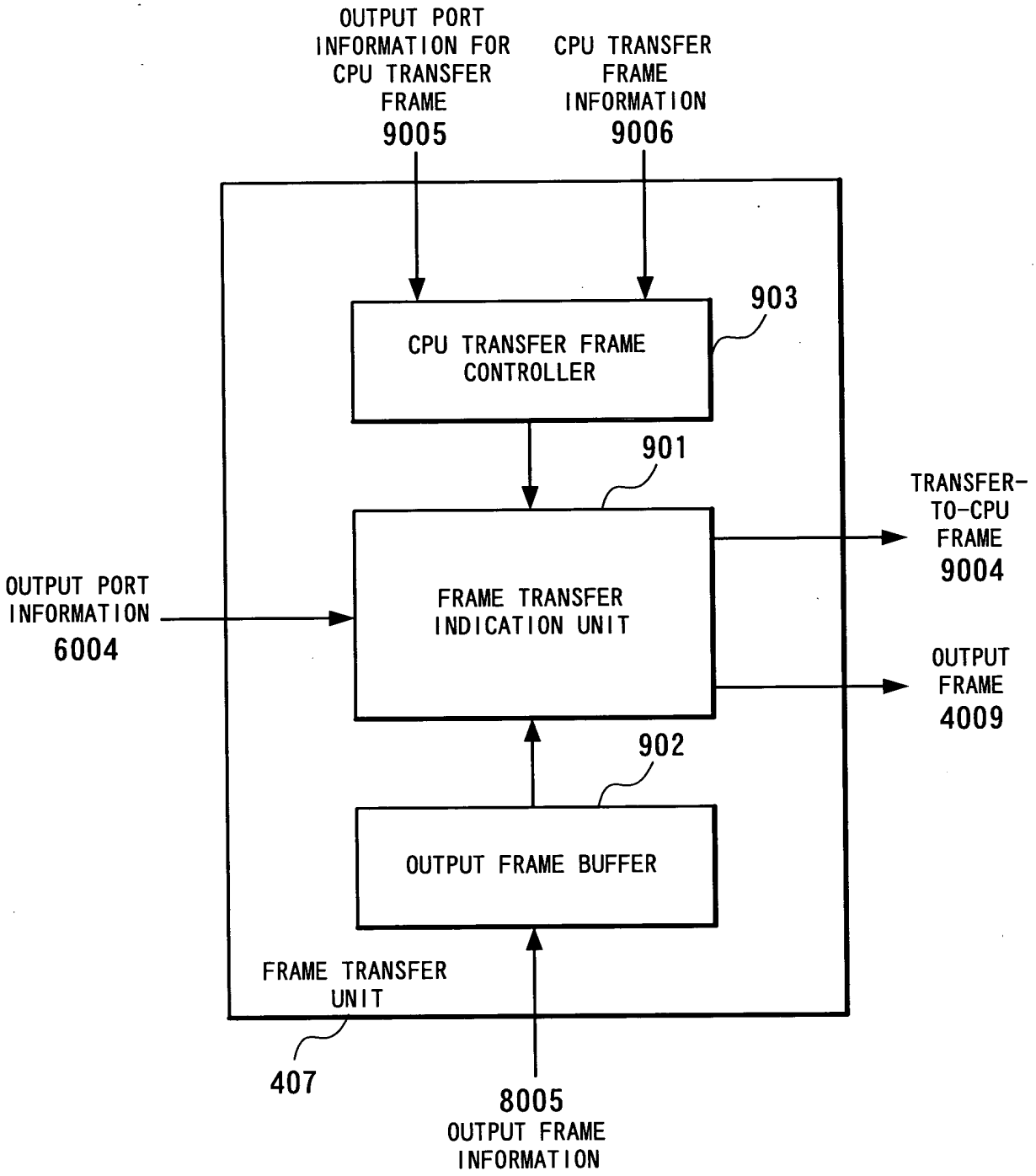

OUTPUT PORT INFORMATION FOR CPU TRANSFER FRAME
9005
CPU TRANSFER FRAME INFORMATION
9006
903
CPU TRANSFER FRAME CONTROLLER
901
TRANSFER-TO-CPU FRAME
9004
OUTPUT PORT INFORMATION
6004
FRAME TRANSFER INDICATION UNIT
OUTPUT FRAME
4009
902
OUTPUT FRAME BUFFER
FRAME TRANSFER UNIT
407
8005
OUTPUT FRAME INFORMATION

FIG.11

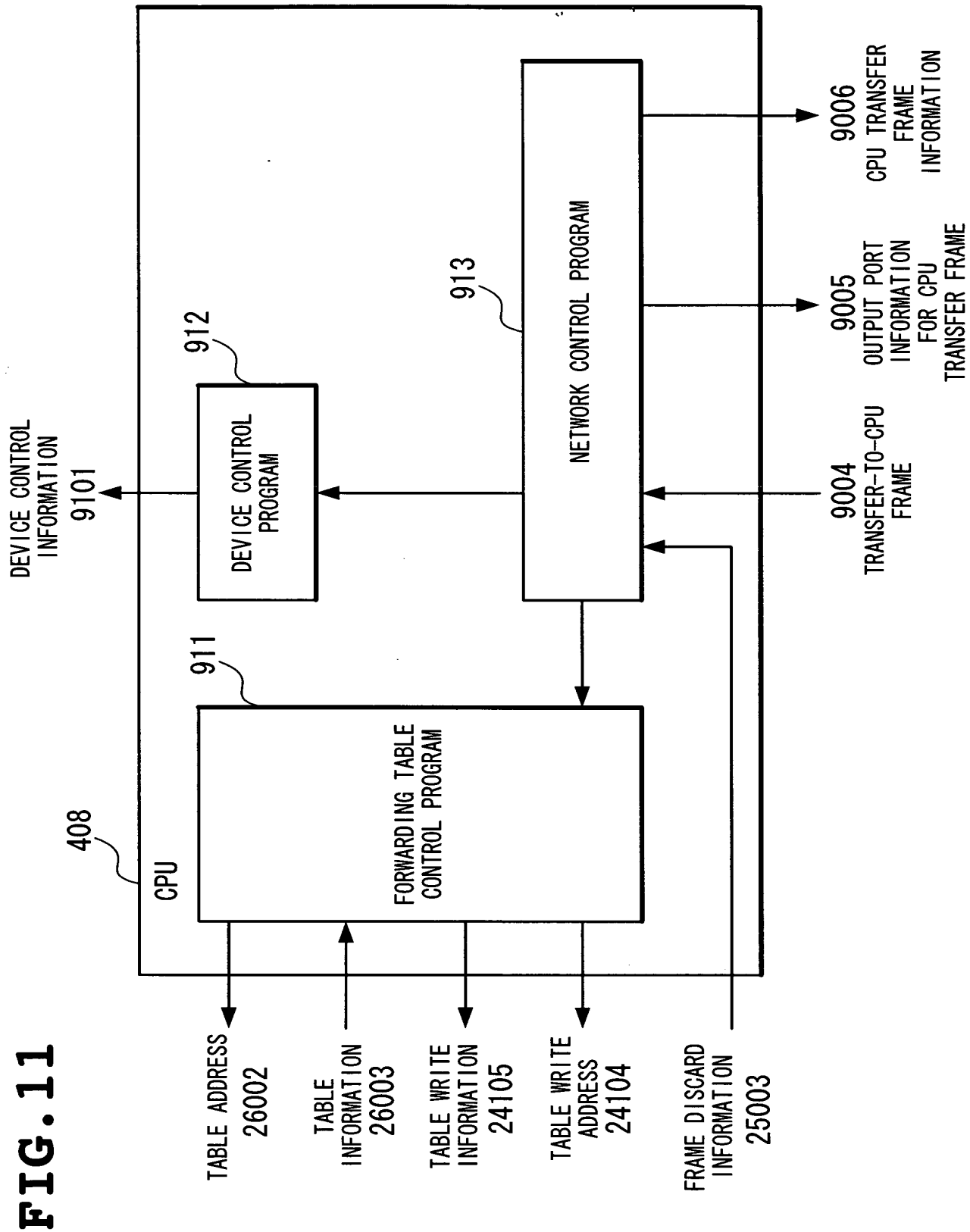

408
CPU
911
FORWARDING TABLE CONTROL PROGRAM
912
DEVICE CONTROL PROGRAM
913
NETWORK CONTROL PROGRAM
DEVICE CONTROL INFORMATION 9101
9004 TRANSFER-TO-CPU FRAME
9005 OUTPUT PORT INFORMATION FOR CPU TRANSFER FRAME
9006 CPU TRANSFER FRAME INFORMATION
TABLE ADDRESS 26002
TABLE INFORMATION 26003
TABLE WRITE INFORMATION 24105
TABLE WRITE ADDRESS 24104
FRAME DISCARD INFORMATION 25003

FIG.12

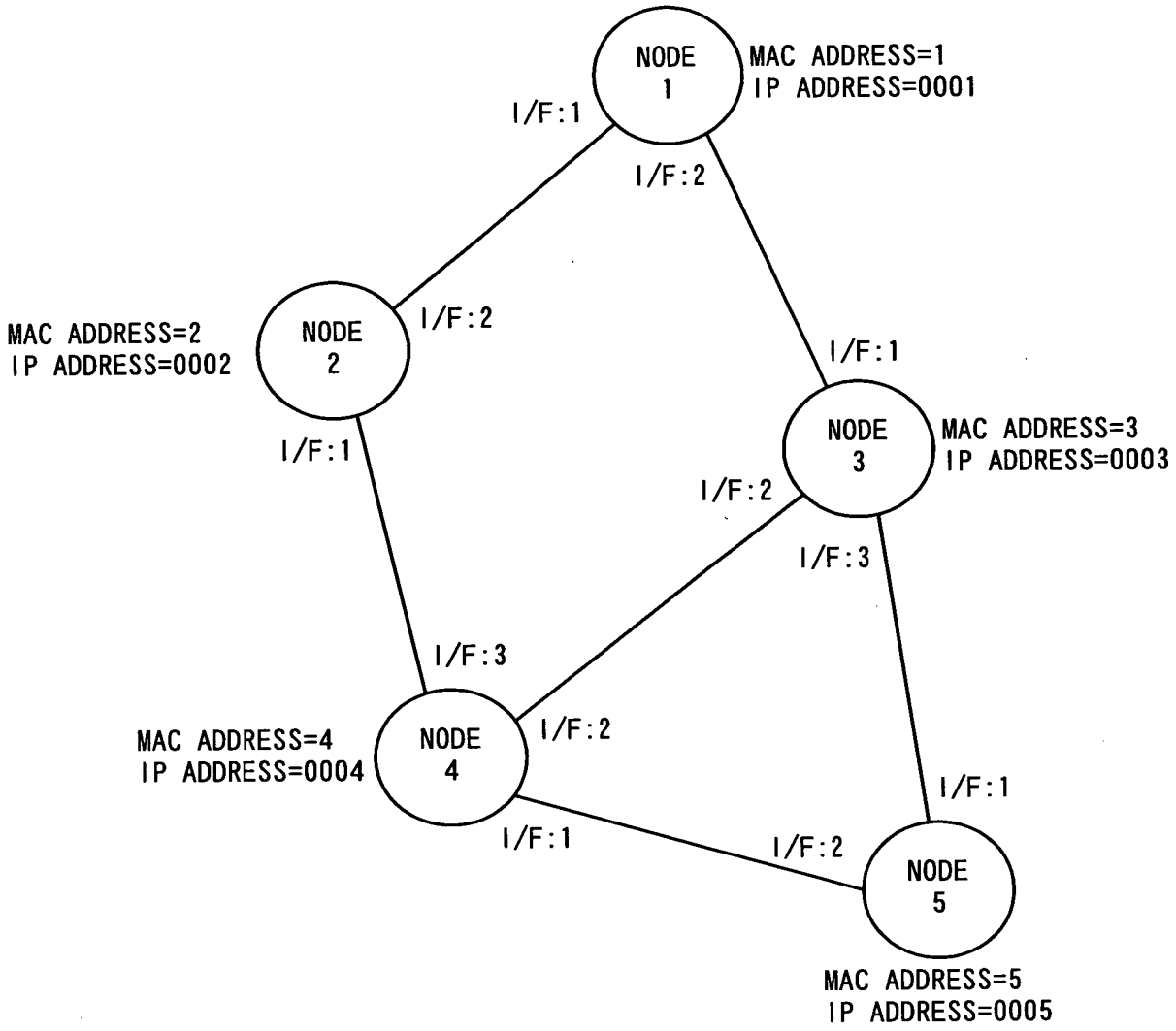

NODE 1
MAC ADDRESS=1
IP ADDRESS=0001
I/F:1
I/F:2
NODE 2
MAC ADDRESS=2
IP ADDRESS=0002
I/F:2
I/F:1
NODE 3
MAC ADDRESS=3
IP ADDRESS=0003
I/F:1
I/F:2
I/F:3
I/F:3
NODE 4
MAC ADDRESS=4
IP ADDRESS=0004
I/F:2
I/F:1
I/F:2
I/F:1
NODE 5
MAC ADDRESS=5
IP ADDRESS=0005

FIG. 13

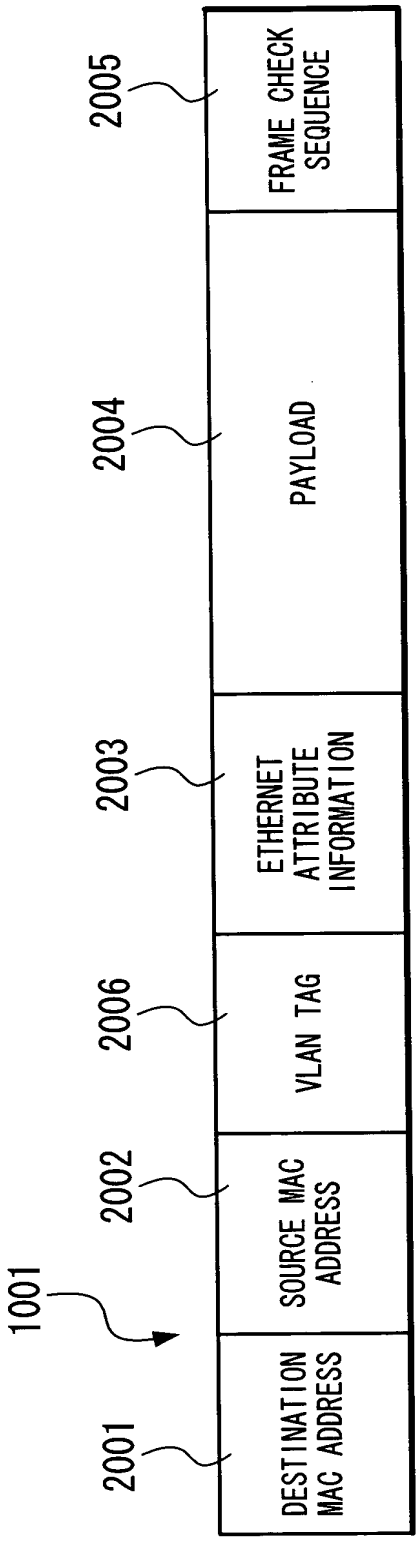

1001
2001
DESTINATION MAC ADDRESS
2002
SOURCE MAC ADDRESS
2006
VLAN TAG
2003
ETHERNET ATTRIBUTE INFORMATION
2004
PAYLOAD
2005
FRAME CHECK SEQUENCE

FIG.14

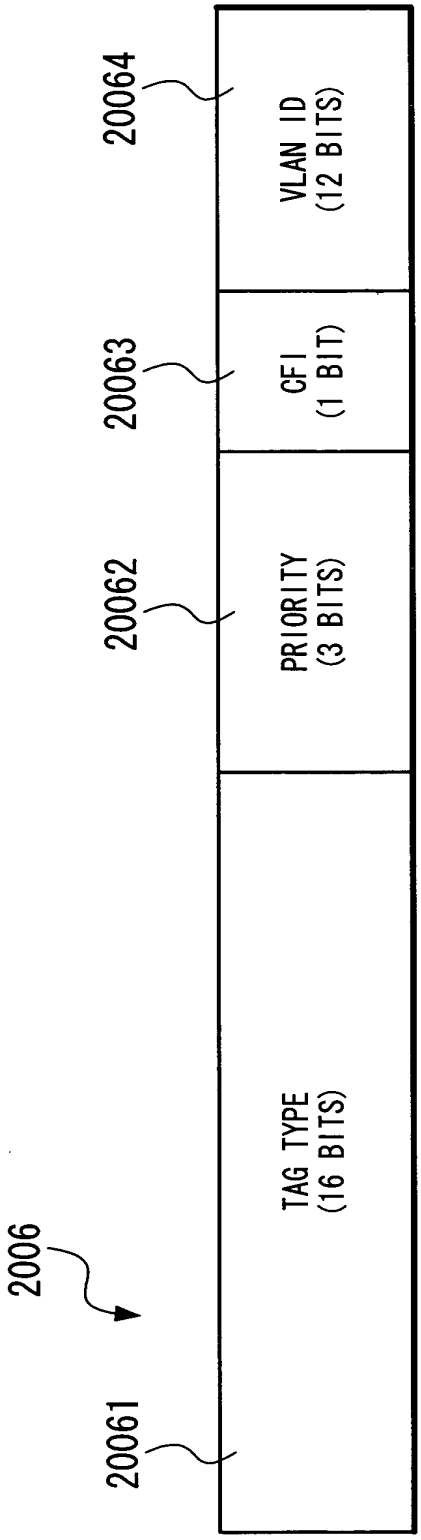

2006
20061
TAG TYPE
(16 BITS)
20062
PRIORITY
(3 BITS)
20063
CFI
(1 BIT)
20064
VLAN ID
(12 BITS)

FIG.15

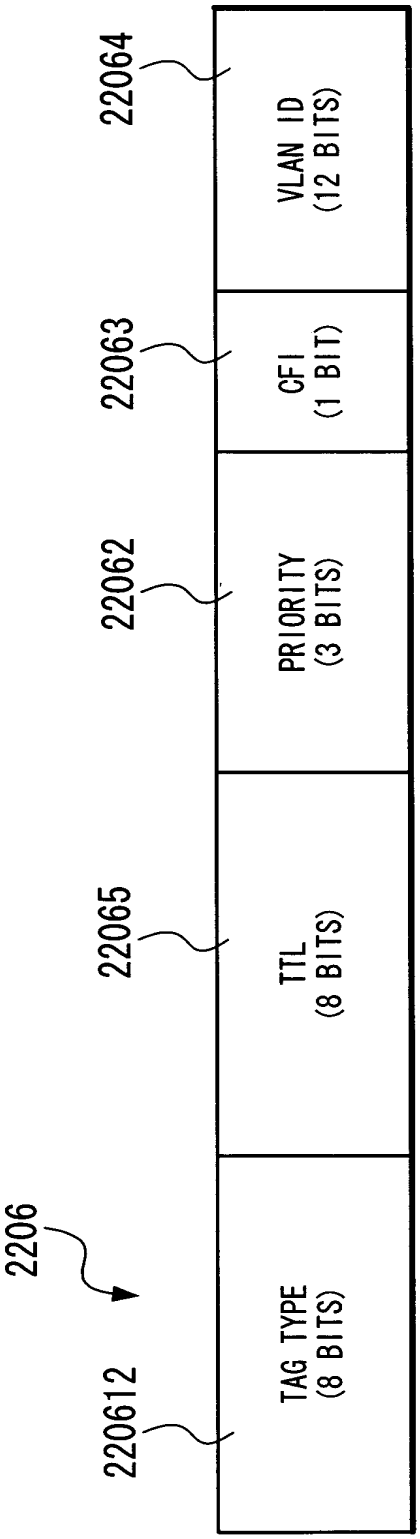

2206
220612
TAG TYPE
(8 BITS)
22065
TTL
(8 BITS)
22062
PRIORITY
(3 BITS)
22063
CFI
(1 BIT)
22064
VLAN ID
(12 BITS)

FIG.16

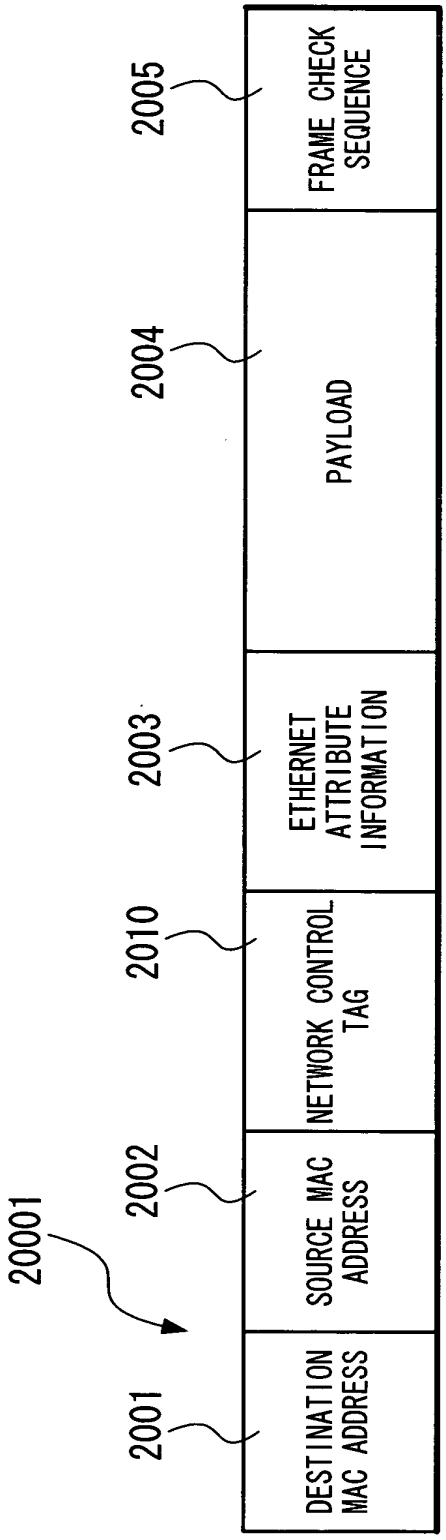
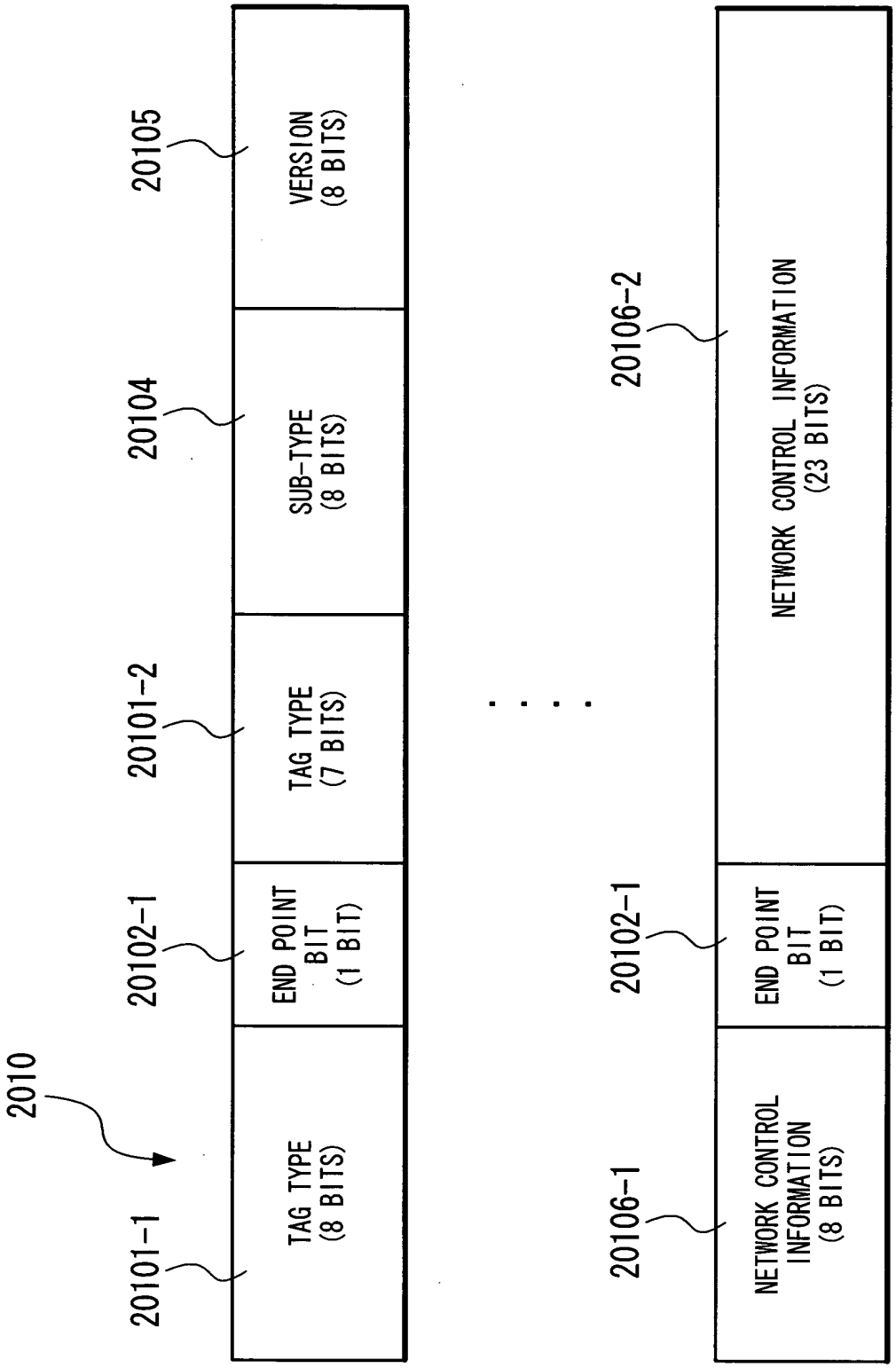

20001
2001
DESTINATION MAC ADDRESS
2002
SOURCE MAC ADDRESS
2010
NETWORK CONTROL TAG
2003
ETHERNET ATTRIBUTE INFORMATION
2004
PAYLOAD
2005
FRAME CHECK SEQUENCE

FIG. 17


2010
20101-1
TAG TYPE (8 BITS)
20102-1
END POINT BIT (1 BIT)
20101-2
TAG TYPE (7 BITS)
20104
SUB-TYPE (8 BITS)
20105
VERSION (8 BITS)
20106-1
NETWORK CONTROL INFORMATION (8 BITS)
20102-1
END POINT BIT (1 BIT)
20106-2
NETWORK CONTROL INFORMATION (23 BITS)

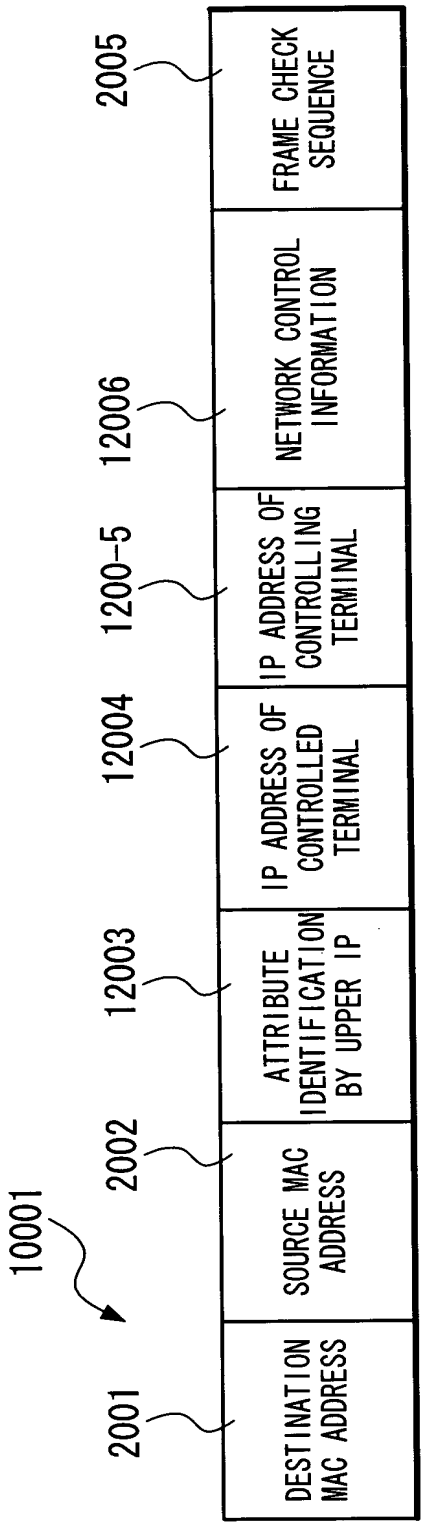



FIG.18 (PRIOR ART)